

**IN THE CLAIMS:**

Please amend the claims as follows:

1. (currently amended) A method of controlling a disc drive using a counter-electromotive force, the method comprising:

- detecting a voltage applied to a voice coil during a predetermined mode;
- performing an operation of the value of the counter-electromotive force using the voice coil voltage;
- comparing the value of the counter-electromotive force operated with a predetermined threshold; and
- when the value of the counter-electromotive force is equal to or larger than the predetermined threshold, controlling a voice coil motor and a spindle motor so that a current mode is stopped and a parking or unloading mode is executed,

wherein the predetermined mode is selected among a seek mode, a track following mode, a read mode, and a write mode.

2. (original) The method as claimed in claim 1, wherein the counter-electromotive force  $e(t)$  is obtained by:

$$e(t) = v(t) - L \times \left( \frac{di}{dt} \right) - R \times i(t)$$

where,  $v(t)$  is a voltage detected from the voice coil,  $L$  is a reactance constant of the voice coil,  $R$  is a resistance toward the voice coil from a VCM driver, and  $i$  is current applied to the voice coil.

3. (cancelled)

4. (currently amended) ~~The method as claimed in claim 1~~ A method of controlling a disc drive using a counter-electromotive force, the method comprising:

- detecting a voltage applied to a voice coil during a predetermined mode;
- performing an operation of the value of the counter-electromotive force using the voice coil voltage;
- comparing the value of the counter-electromotive force operated with a predetermined threshold; and
- when the value of the counter-electromotive force is equal to or larger than the predetermined threshold, controlling a voice coil motor and a spindle motor so that a current mode is stopped and a parking or unloading mode is executed,

wherein the predetermined threshold is calculated from a regression function corresponding to a statistical correlation between the magnitude of an external shock and the counter-electromotive force.

5. (original) A method of controlling a disc drive using a counter-electromotive force, the method comprising:

detecting a moving distance variation  $\Delta Lh/\Delta t$  of a transducer with respect to a variation in time during a predetermined mode;

performing an operation of a value of the counter-electromotive force by applying the detected moving distance variation  $\Delta Lh/\Delta t$  of the transducer with respect to the variation in time to a predetermined counter-electromotive force calculation Equation;

comparing the value of the counter-electromotive force with a predetermined threshold;  
and

when the value of the counter-electromotive force is equal to or larger than the predetermined threshold, controlling a voice coil motor and a spindle motor so that a current mode is stopped and a parking or unloading mode is executed.

6. (original) The method as claimed in claim 5, wherein the predetermined counter-electromotive force calculation Equation is

$$e(t) = \left(\frac{Ke}{Rh}\right) \times \left(\frac{dLh}{dt}\right),$$

where, Ke is a counter-electromotive force constant, and Rh is a distance from a pivot bearing to a transducer.

7. (original) The method as claimed in claim 5, wherein the predetermined mode is selected among a loading mode, a seek mode, a track following mode, a read mode, and a write mode.

8. (original) The method as claimed in claim 5, wherein the predetermined threshold is calculated from a regression function corresponding to a statistical correlation between the magnitude of an external shock and the counter-electromotive force.

9. (currently amended) A disc drive, comprising:

a disc having a surface;

a spindle motor to rotate the disc;

a transducer to write and read information in and from the disc;

a voice coil motor to move the transducer; and

a controller to control the spindle motor and the voice coil motor according to a set mode, and to perform a shock damage prevention process of controlling the voice coil motor and the spindle motor, so that a current mode is stopped and a parking or unloading mode is executed if a counter-electromotive force operation process of performing an operation of a value of a counter-electromotive force using a voltage detected from the voice coil and the value of the counter-electromotive force are equal to or larger than a predetermined threshold value,

the voltage detected from the voice coil being determined according to a position error of the transducer.

10. (cancelled)

11. (original) The disc drive as claimed in claim 9, wherein the predetermined mode is selected among a loading mode, a seek mode, a track following mode, a read mode, and a write mode.

12. (currently amended) ~~The disc drive as claimed in claim 9A~~ disc drive, comprising:

a disc having a surface;

a spindle motor to rotate the disc;

a transducer to write and read information in and from the disc;

a voice coil motor to move the transducer; and

a controller to control the spindle motor and the voice coil motor according to a set mode,

and to perform a shock damage prevention process of controlling the voice coil motor and the spindle motor, so that a current mode is stopped and a parking or unloading mode is executed if a counter-electromotive force operation process of performing an operation of a value of a counter-electromotive force using a voltage detected from the voice coil and the value of the counter-electromotive force are equal to or larger than a predetermined threshold value,

wherein the predetermined threshold is calculated from a regression function corresponding to a statistical correlation between the magnitude of an external shock and the counter-electromotive force.

13. (currently amended) ~~The disc drive as claimed in claim 9A~~ disc drive, comprising:

a disc having a surface;

a spindle motor to rotate the disc;

a transducer to write and read information in and from the disc;

a voice coil motor to move the transducer; and

a controller to control the spindle motor and the voice coil motor according to a set mode, and to perform a shock damage prevention process of controlling the voice coil motor and the spindle motor, so that a current mode is stopped and a parking or unloading mode is executed if a counter-electromotive force operation process of performing an operation of a value of a counter-electromotive force using a voltage detected from the voice coil and the value of the counter-electromotive force are equal to or larger than a predetermined threshold value,

wherein the controller further comprises:

a circuit to compensate signal delay between a driving signal to drive the voice coil motor and a voltage detection signal from the voice coil.

14. (original) A disc drive, comprising:

a disc having a surface;

a spindle motor to rotate the disc;

a transducer to write and read information in and from the disc;

a voice coil motor to move the transducer; and

a controller to control the spindle motor and the voice coil motor according to a set mode, and using a moving distance variation  $\Delta Lh/\Delta t$  of the transducer with respect to a variation in time detected during the set mode  $\Delta t$ , to perform a shock damage prevention process of controlling the voice coil motor and the spindle motor, so that a current mode is stopped and a parking or unloading mode is executed if a counter-electromotive force operation process of performing an operation of the value of a counter-electromotive force using a predetermined counter-electromotive force calculation Equation and the value of the counter-electromotive force of which operation is performed in the counter-electromotive force operation process are equal to or larger than a predetermined threshold value.

15. (original) The disc drive as claimed in claim 14, wherein the predetermined counter-electromotive force calculation Equation is

$$e(t) = \left(\frac{Ke}{Rh}\right) \times \left(\frac{dLh}{dt}\right),$$

where, Ke is a counter-electromotive force constant, and Rh is a distance from a pivot bearing to the transducer.

16. (original) The disc drive as claimed in claim 14, wherein the predetermined mode is selected among a loading mode, a seek mode, a track following mode, a read mode, and a write mode.

17. (original) The disc drive as claimed in claim 14, wherein the predetermined threshold is calculated from a regression function corresponding to a statistical correlation between the magnitude of an external shock and the counter-electromotive force.

18. (currently amended) A computer readable storage storing at least one program to control a disc drive using a counter-electromotive force according to a process comprising:  
detecting a voltage applied to a voice coil during a predetermined mode;  
performing an operation of the value of the counter-electromotive force using the voice coil voltage;  
comparing the value of the counter-electromotive force operated with a predetermined threshold; and  
when the value of the counter-electromotive force is equal to or larger than the predetermined threshold, controlling a voice coil motor and a spindle motor so that a current mode is stopped and a parking or unloading mode is executed,  
wherein the predetermined mode is selected among a seek mode, a track following mode, a read mode, and a write mode.

19. (original) The computer readable storage as claimed in claim 18, wherein the counter-electromotive force  $e(t)$  is obtained by:

$$e(t) = v(t) - L \times \left( \frac{di}{dt} \right) - R \times i(t)$$

where,  $v(t)$  is a voltage detected from the voice coil,  $L$  is a reactance constant of the voice coil,  $R$  is a resistance toward the voice coil from a VCM driver, and  $i$  is current applied to the voice coil.

20. (cancelled)

21. (currently amended) The computer readable storage as claimed in claim 18A  
computer readable storage storing at least one program to control a disc drive using a counter-  
electromotive force according to a process comprising:  
detecting a voltage applied to a voice coil during a predetermined mode;  
performing an operation of the value of the counter-electromotive force using the voice  
coil voltage;  
comparing the value of the counter-electromotive force operated with a predetermined  
threshold; and  
when the value of the counter-electromotive force is equal to or larger than the

predetermined threshold, controlling a voice coil motor and a spindle motor so that a current mode is stopped and a parking or unloading mode is executed,

wherein the predetermined threshold is calculated from a regression function corresponding to a statistical correlation between the magnitude of an external shock and the counter-electromotive force.

22. (original) A computer readable storage storing at least one program to control a disc drive using a counter-electromotive force according to a process comprising:

detecting a moving distance variation  $\Delta Lh/\Delta t$  of a transducer with respect to a variation in time during a predetermined mode;

performing an operation of a value of the counter-electromotive force by applying the detected moving distance variation  $\Delta Lh/\Delta t$  of the transducer with respect to the variation in time to a predetermined counter-electromotive force calculation Equation;

comparing the value of the counter-electromotive force with a predetermined threshold; and

when the value of the counter-electromotive force is equal to or larger than the predetermined threshold, controlling a voice coil motor and a spindle motor so that a current mode is stopped and a parking or unloading mode is executed.

23. (original) The computer readable storage as claimed in claim 22, wherein the predetermined counter-electromotive force calculation Equation is

$$e(t) = \left(\frac{Ke}{Rh}\right) \times \left(\frac{dLh}{dt}\right),$$

where, Ke is a counter-electromotive force constant, and Rh is a distance from a pivot bearing to a transducer.

24. (original) The computer readable storage as claimed in claim 22, wherein the predetermined mode includes a loading mode, a seek mode, a track following mode, a read mode, and a write mode.

25. (original) The computer readable storage as claimed in claim 22, wherein the predetermined threshold is calculated from a regression function corresponding to a statistical correlation between the magnitude of an external shock and the counter-electromotive force.

26. (original) A method of controlling a disc drive having a transducer and a disc by using a counter-electromotive force, the method comprising:

calculating the counter-electromotive force using a voice coil voltage or a position error signal without installing an additional shock sensor to sense disturbance in the disc drive;

determining a magnitude of an external shock or a magnitude of vibration by the calculated counter-electromotive force; and

when the magnitude of an external shock or the magnitude of vibration determined by the counter-electromotive force exceeds a tolerance range of the disc drive, controlling the disc drive so that a current mode is automatically converted into a parking or unloading mode, preventing malfunctions of the disc drive due to collisions between the transducer and the disc.